

REMARKSSpecification

The specification has been amended to move paragraphs from the "Background of the Invention" and to insert them as new paragraphs in the "Description of the Preferred Embodiments" section. This amendment is made in order to clarify the description of the preferred embodiments. The words recited in the paragraphs of the specification remain unchanged.

Claim Rejections - 35 USC § 112

Claims 1, 3-13 were rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The office action states:

"The language "integral photography type apparatus" is indefinite, as there is no line between where devices are of the integral photography type and where they are not. Nearly all stereo display systems using lens arrays or parallax barriers operate on the same principal as integral photography, but are not true integral photography as they do not use a continuous film and take a photo at each lens in the array. Some use the same principal and have as little as two side by side images, and some then take those two side by side images and duplicate them and send them to multiple viewing zones to create multiple viewing windows, then some applying additional varying effect. As they stereo or multi view display keep varying from the integral photography type further and further, there no way to determine where the line is between "integral photography type" and "not integral photography type"."

Applicants hereby cancel independent claim 1 and present new independent claims 14 and 18. Claims 14 and 18 relate respectively to a display apparatus and system without limitation to a particular photography method. Therefore, the invention can be clearly and properly defined based solely

upon applicants' claimed elements, without the need to determine a line between "integral photography type" and "not integral photography type."

That is, claim 14 recites an apparatus for displaying an image of an object to a viewer. The apparatus comprises a display for displaying a first image of the object and at least one light source arranged with respect to the display so as to at least partially illuminate the displayed first image. An array is spaced from the display by a first distance. The array and the display are arranged with respect to the light source such that light from the illuminated, displayed first image passes, at least partially, through the array so as to provide a second image of the object to the viewer. The second image appears at a second distance with respect to the viewer. The apparatus further comprises means for adjusting the second distance by adjusting the first distance. Support for applicants' claim amendments are as follows.

Support for the terms "array" and "display" can be found in applicants' specification, for example, on page 4 lines 16-20 which states: "The image reproducing device according to the invention comprises ...the flat surface display (LCD 14) and the passive array 16.

Support for the claimed "first image of an object" is found on page 5, lines 24-29 wherein is stated: "The signals provided by the 3D image capturing unit 26 are transferred at the input of an image processing unit 28 which controls the flat surface display 14 in order that the pixels of this LCD provide the correct image of the original object."

Support for the claimed "second image" can be found in the specification as it describes "virtual object" as relating to a reproduced object. Refer to applicants' specification, for example, on page 4 lines 25 - 29 wherein is stated, "...if the virtual object P_1Q_1 does not appear at an optimum distance for the observer. For instance if, as shown on figure 2, the virtual image P_1Q_1 is too close from the eyes 20, 22 of the observer it is desirable to produce a virtual 3D image $P'Q'$ which is at a greater distance from the eyes."

Support for the array and display panel spaced by a first (adjustable) distance, can be found in applicants' specification, for example, on page 4 lines 30-33 wherein is stated, "In this last example, and according to an embodiment, the distance d between the passive array 16 and the active array 14 is increased from d to d' ."

Support for the claimed arrangement of the light source, the display and the array can be found in applicants' specification page 2, lines 12-24, wherein is stated: "The reproducing apparatus comprises an array 16 of holes or apertures, or lenses (passive array) ... This array 16 is associated to the flat surface display 14 and to a light source 18 in such a way that light emitted by source 18 crosses the display 14 and, afterwards, the holes of array 16."

Applicants' claimed "means for adjusting said first distance such that said second distance is also adjusted" is supported in applicants' specification, for example, on page 5, lines 23-34, wherein is stated. "A controller 30 (figures 3 and 4) has an input 32 receiving a signal from a manual command device 34 under the control of an operator who provides command signals representing the direction desired for the movement of the object (farther or closer)."

Therefore applicants believe new claim 14 particularly points out and distinctly claims the subject matter which applicant regards as the invention. Accordingly, applicants request withdrawal of the rejection under 35 USC § 112.

Applicants' new claim 18 recites a system for displaying an image of an object to a viewer. The system comprises an image capture unit for capturing a first image of the object. The image capture unit comprises a first array and a detecting element. The first array element and the detecting element are spaced apart by a first distance. The system further comprises an image reproducing unit for receiving the first image. The image reproducing unit comprises a second array and a display. The second array and the display are spaced apart by a second distance. The reproduced

object is displayed to a viewer so as to appear at a third distance with respect to said viewer. The image reproducing unit comprises means for adjusting the second distance such that the third distance is adjusted.

Support for new claim 16 can be found in applicant's specification. Specifically, support for "an image capture unit for capturing a first image of the object" is provided in the paragraphs moved from the "background of the invention" section and added to the "description of the invention" section of applicants' specification. These paragraphs state, in relevant portion: "In the example shown on figure 1 an object point P illuminates the detector elements A5, B3, C2 and the object point Q illuminates the detector elements A7, B6 and C5.

The correspondence between CCD elements and display pixels is such that to each CCD detector A, B, C ... corresponds a reproducing section A', B', C' and the order of the pixels in each reproducing section (A' for example) is inverted with respect to the order of the CCD elements in the corresponding (A) CCD detector. For example on figure 1 the CCD element A1 is on the right part of CCD detector A and, on figure 2, the corresponding pixel element A'1 is on the left part of this section."

Therefore applicants believe new claim 16 particularly points out and distinctly claims the subject matter which applicants regard as the invention. Accordingly, applicants request withdrawal of the rejection under 35 USC § 112.

Claim Rejections - 35 USC § 103

Claims 1,3-13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Gulick Jr6046848 in view of Spruck 5978143, Zeiss DE29612054U, Sugihara et al IEICE and Sugihara et al SID.

The office action cites all of the secondary references (Spruck, Zeiss and Sugihara) as showing the movement of the arrays relative to each other. The office action states the movement is "for the benefit of enabling the user to move

and/or to keep accommodation and vergence to the same distance for better user comfort."

Therefore, the office action concludes it would have been obvious to one of ordinary skill, in the device of Gulick Jr, to employ the relative movement details as claimed for the benefit of enabling user movement and and/or to keep accommodation and vergence to the same distance for better user comfort.

Applicants note the following with respect to the cited prior art references in relation to applicants' amended claims.

Hamagashi

As noted in applicants' response to the previous office action, Hamagashi contains no disclosure of controlling the distance **between** the array and the display. Further, Hamagashi lacks disclosure, suggestion or teaching of a display for displaying a first image and a light source arranged "with respect to said display so as to at least partially illuminate said displayed first image", as recited in applicants' claim 14.

Hamagashi uses two projectors(1L and 1R) to project two separate images relating to the same object. See Hamagashi col 4 lines 15-18 "the first projector projects a left eye image and the second projector projects a right eye image." A liquid crystal display (LCD) projector, for example is used as the projectors." Thus there is no disclosure or suggestion in Hamagashi to use a light source to at least partially illuminate an image displayed by a display.

According to Hamagashi, the two images pass through a light shading means, e.g. LCD (2a). Hamagashi discloses a screen comprising a dispersion panel 2b.

After passing through the light shading means the two images form pairs of right and left eye images on the dispersion panel 2b. The light shading portion can be shifted in the transverse direction.

Gulick Jr 6046848; Spruck 5978143 ; Zeiss DE29612054U;
Sugihara et al IEICE ; and Sugihara et al SID

Gulick Jr 6046848; Spruck 5978143 ; Zeiss DE29612054U ; Sugihara et al IEICE ; and Sugihara et al SID, lack any teaching or suggestion of applicants claimed features including, among others, a display for displaying a first image and a light source arranged "with respect to said display so as to at least partially illuminate said displayed first image", as recited in applicant's claim 14. Furthermore, Spruck, in particular, contains no disclosure of an array and a display separated by a distance wherein the distance can be changed.

Claims 3-13, and claims 15-17 depend ultimately from claim 14, and are therefore deemed to include the limitations of claim 14. Applicants believe claim 14 is allowable. Claim 16 is a system claim including novel elements recited in claim 14, in addition to reciting an image capturing device. None of the cited references disclose such as system. Therefore, applicant believes claim 16 is allowable. Accordingly, Applicants respectfully request the withdrawal of the rejections under 35 U.S.C. 112, second paragraph and 103(a) and allowance of the claims as amended herein.

Applicants invite the Examiner to call the undersigned if the examiner believes a telephone interview would clarify any issues raised herein.

Respectfully submitted,

Date:

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